

Remarks

Claims 1-5 and 20 have been canceled and Claims 6-19 remain pending. Claim 6 has been amended to include the features of canceled Claim 20; no new matter has been added. Accompanying this response is a Request for Continued Examination.

Claims 6-14 and 18-29 stand rejected under 35 U.S.C. §103(a) as being obvious from the teachings of Kanematsu in view of Holupka, and further in view of a newly cited reference, Zhang. Claims 15-17 similarly stand rejected under 35 U.S.C. §103(a) as being obvious from the teachings of Kanematsu in view of Holupka, Vaezy and Zhang.

Amended Claim 6 is directed to a radiotherapy apparatus that processes two-dimensional radiation imaging to produce tomography data (i.e., three-dimensional imaging data). The tomography data provides sectional views containing pixels derived from averaging voxels from the tomography data which are disposed transversely to the sectional view. A therapeutic source can be controlled according to this arrangement to produce therapeutic radiation. In addition, Claim 6 has been amended to further require the features present in canceled Claim 20 that there be a plurality of section views that intersect "substantially at the isocenter of the therapeutic source." Such an arrangement is not taught or suggested by the prior art.

First, on page 2, paragraph 5, the Office action incorrectly characterizes the Kanematsu system as teaching a two-dimensional imager. That is not correct. Kanematsu discloses a "conventional" CT scanner (see column 2, lines 10-11) with a conventional one-dimensional detector with "a row of detecting elements in an arc shape" (see column 2, line 23). But Kanematsu does not teach or suggest a two-dimensional imager and there is no disclosure in Kanematsu of a cone beam CT system or a two-dimensional imager, and thus Kanematsu fails to

teach or suggest a system as required by the present claims which are directed to a two-dimensional imager responsive to imaging radiation to generate a two-dimensional imaging output.

Moreover, the imaging output of the present claims is processed to produce tomography data including a plurality of sectional views that intersect “substantially at the isocenter of the therapeutic source” where each sectional view is “an image containing pixels with values derived from averaging a plurality of voxels in the tomography dataset which are disposed transverse to the corresponding section.” The Examiner correctly identified that Kanematsu does not teach or suggest such functionality, but he contends that it is taught by Holupka. Again, Applicant respectfully disagrees. Holupka discloses a 3-D visualization technique for invasive radiotherapy, but does not teach or suggest that the 3-D ultrasound data, which is represented as 2-D sectional views, is derived as a result of averaging a plurality of voxels in the “image stack,” which are disposed transverse to the corresponding section. Thus, like Kanematsu, Holupka fails to teach the section view arrangement required by the claims: a plurality of sectional views that intersect “substantially at the isocenter of the therapeutic source” where each sectional view is “an image containing pixels with values derived from averaging a plurality of voxels in the tomography dataset which are disposed transverse to the corresponding section.”

Paragraph 8 of the Office Action contends that it would have been obvious to modify Kanematsu with the teachings of Holupka to produce a plurality of intersecting sectional views because “such a set-up would result in better diagnosis, as a sectional view will provide more precise determination of the treatment site.” But that bare statement fails to offer any reason why one of skill in the art would contemplate such a thought experiment. Kanematsu is concerned

with displaying a numerical result it would be bizarre to modify Kanematsu's arrangement of a numerical result denoting the degree of difference between the CT data and the planning data as suggested by the Examiner to produce the plurality of intersecting sectional in a way somewhat but not quite like what is taught by Holupka. In fact, the Examiner's suggestion would require impermissibly altering the fundamental principle of Kanematsu, which the MPEP does not permit in a proper obviousness analysis. See MPEP §2143.01: "THE PROPOSED MODIFICATION CANNOT CHANGE THE PRINCIPLE OF OPERATION OF A REFERENCE." Such an error is a telling sign that the Examiner has improperly attempted to use impressive hindsight in the form of trying to use the claims as a blueprint which he tries to assemble with bits and pieces of the prior art references.

The foregoing is reason enough to explain the allowability for the present claims over the cited references. In addition, though, the present claims also require that the imaging arrangement obtain pixel values from averaging a plurality of voxels. As acknowledged in paragraph 9 on page 3 of the Office Action, a combination of the Kanematsu and Holupka documents does not disclose such an arrangement. Instead, the Examiner contends that it would have been obvious to combine the teachings of Kanematsu and Holupka with the newly cited Zhang document to arrive at the present invention. Again, Applicants disagree.

Zhang discloses a method for displaying breast ultrasound information, wherein a plurality of two-dimensional coronal images is generated from a three-dimensional data volume. Significantly, Zhang does not disclose producing a plurality of sectional views intersecting substantially at the isocenter of a therapeutic source, or a therapeutic source controllable in

response to feedback from the data set to produce therapeutic radiation. Zhang discloses displaying multiple slices but solely for diagnostic purposes.

The Examiner asserts in paragraph 11 of the Office Action that it would have been obvious to modify Kanematsu and Holupka to obtain pixel values by averaging voxels, as taught by Zhang, because this would result in a better diagnosis. But the disclosure of the Zhang document as a whole is concerned with the field of ultrasound imaging and specifically how the use of ultrasound overcomes problems associated with the use of X-rays in mammography. Although there is reference made in paragraph [0091] to the possibility of applying the invention to CT imaging, this conflicts with the problems identified in paragraphs [0003] and [0004] (how to reduce overall teaching of Zhang and the X-ray exposure to the patient, poor diagnostic information in the X-ray image, and difficulties in imaging near to the chest wall). When seeking to solve the problem of how to reduce noise in a radiotherapy apparatus with a 2D imager to accurately control a therapeutic radiation source, one of ordinary skill in the art would not have looked to the Zhang document, which is concerned with ultrasound screening.

In short, there is no indication in the disclosures of Kanematsu, which relates to a conventional CT scanner being used to display a numerical result, that would lead the skilled person to arrive at the radiotherapy apparatus of present Claim 6, which produces a plurality of sectional views intersecting substantially at the isocenter of the therapeutic source containing pixel values derived from averaging a plurality of voxels. In the absence of any recognizable pointer in the Kanematsu document that would have led the skilled person to the combination of all three documents cited by the Examiner the invention should be acknowledged to be non-obvious.

Thus, no combination of Kanematsu, Holupka and/or Zhang teaches or suggests the arrangement required by Claim 6, which is therefore allowable. Claims 7 to 20 are all dependent on Claim 6 and are therefore allowable for the same reasons. Reconsideration of the claims and issuance of a Notice of Allowance is respectfully requested.

Conclusion

Applicant hereby requests a three month extension of time in accordance with the provisions of 37 C.F.R. § 1.136. Please charge deposit account 19-4972 for the amount of \$1,110.00 for the fee for the three month extension of time. Applicant believes that no further extension of time is required; however, this conditional petition is being made to provide for the possibility that the applicant has inadvertently overlooked the need for a further additional extension of time. If any additional fees are required for the timely consideration of the application, please charge deposit account number 19-4972.

Respectfully submitted,

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